FUELING A DIGITAL METHANE FUTURE

The role of digital technologies in minimizing global oil and gas methane emissions

Growth and opportunity

Digitalization of the oilfield, such as automated asset management, predictive maintenance and industrial internet of things (IIoT), has the potential to unlock up to \$1.6 trillion in value. A new report from Accenture Strategy and Environmental Defense Fund outlines how to leverage digital transformation to optimize, accelerate and scale global methane mitigation. Companies can first identify where they are on the digital methane continuum (Figure 1) and then identify the best projects to explore integrating methane into their digitalization work (Figure 2).

Integrating methane into digital technology upgrades improves efficiency, saves product

Reducing emissions could save upstream oil and gas companies US\$34 billion globally. Science shows that 80 percent of methane emissions are caused by 20 percent of the leaks. Digitally-enabled leak management has the potential to immediately identify that 20 percent.

Today, field staff are deployed to search for leaks with handheld instruments. Not only could digitally-based methane management significantly reduce overall detection costs, it could potentially leapfrog early phase, manual steps. By integrating methane emissions management from the start, companies can determine where the biggest problems are, in real time.

To stay competitive tomorrow, methane technologies need to go digital

For industry leaders that have committed to time-bound methane reduction targets, such as the thirteen members of the Oil and Gas Climate Initiative, digital solutions are a critical tool for realizing methane commitments and verifying emission reductions.

FIGURE 1 THE DIGITAL METHANE MATURITY CONTINUUM

DIGITAL TECHNOLOGIES LEVERAGED

STAGE 0

- · No formal methane mitigation strategy in place
- Emission mitigation activities are primarily government mandated
- Limited historical data collection
- Environmental impact is not prioritized
- Manual, piecemeal approach to fix leaks

STAGE 1

- · Time and resource intensive Operations and Maintenance (O&M)
- Manual, decentralized data collection and analytics
- No coordination be-
- tween technologies · Intermittent use of
- monitoring equipment · Limited exposure, confidence in machine generated data
- · Corrective actions based on a scheduled detection routine

STAGE 2

- · Regular automated monitoring and data collection
- Single vendor technology adoption (no combinatorial application)
- Regular, dedicated investment in new technology training for field operators
- · Centralized, cloud based analytics
- · Remote monitoring and visualization
- · Generation of high quality data · Utilization of advanced
- analytics methods · Reputation of gas and

- STAGE 3
- · Comprehensive carbon reduction strategy (beyond methane)
- Advanced analytics using combinatorial
- technology application Waste emissions re-use across the value chain
- Automated decisionmaking and self adjusting equipment
- Utilization of digital brain to model and run millions of scenarios to calculate, optimize, and enable minimum emissions

· Safety and compliance

LEGEND

 Environmental objectives

triple bottom line

· Best in class operations

ADOPTION **DRIVERS**

TYPICAL

CHARACTERISTICS



HANDHELD



WEARABLES DRONES.



IOT SENSODS



CLOUD



MACHINE

FIGURE 2 A ROADMAP FOR THE INDUSTRY

AT EACH STAGE FROM INDUSTRY SHELL DEPLOYS AI TO IMPROVE OPERATING · Adopt integrated, systems-PERFORMANCE based business brain Shell is aiming for improved operating performance technology to automate system with C3 IoT as its artificial intelligence (AI) platform. optimization Leverage combinatorial Shell will deploy the platform on Azure for a broad set STAGE 3 technology applications and of AI applications, starting with predictive mainteautomated decision making to nance for hundreds of thousands of critical pieces of target zero emissions across equipment globally.31 the value chain **BP LOWERS METHANE EMISSIONS EVENTS BY 74%** · Automate pattern and trend analysis to enable limited BP is leveraging San Francisco-based Kelvin Inc's machine learning for trend sensor and Al-enabled solution to monitor and detection remotely manage production operations in Wyoming. Leverage robust historical BP estimates that methane emissions events from data to train AI algorithms to venting have declined 74%, while production volumes STAGE 2 predict and detect leaks and increased 20% and overall costs dropped 22%. mechanical anomalies Adopt digitally enabled 'asset Recently, the Oil and Gas Climate Initiative Climate automation' capabilities, Investments fund announced that it has invested in operators can manage network Kelvin Inc., the first digital solution in the OGCI-CI pressure in real time · Adopt a cloud-based data **CONTINUOUS METHANE DETECTION AT EQUINOR** management solution to Over the last several years, Equinor has been testing centralise methane data fixed, continuous methane monitors at onshore assets STAGE 1 Integrate methane emissions in the United States. This system integrates ambient and operational data to run data with methane readings from laser-based sensors basic historical and correlation to detect and quantify leaks. The data is transmitted analyses and derive deeper to tablets and assigned an alarm designation based on the severity of the leak.33 insights around emissions **METHANE REDUCTION PROGRAM AT XTO** Build an emissions baseline · Build an integrated methane ExxonMobil US subsidiary, XTO, has established STAGE 0 emissions strategy a methane emissions reduction program for all Conduct a methane technology US operations that both ensures compliance with assessment to identify areas applicable regulations and extends beyond regulatory where methane monitoring requirements. XTO is in the process of phasing out high bleed pneumatic devices and as of 2018, can be integrated into existing operational architecture they have replaced approximately two-thirds of them. The company has rolled out a LDAR program and is investing in research on advanced methane management technologies.34

USE CASES

PROJECTS TO EXPLORE

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